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ABSTRACT

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Individual Differences in Cognition: Verbal Ability, Clustering, and Retrieval Speed

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Abstract

Relationships between verbal ability, semantic category clustering, and speed of retrieval were studied. Lists of 30 words were presented individually to subjects with high- and low-verbal ability under free recall, delayed free recall, and clustering recall conditions. In the first stage of recall, high verbals displayed a significantly higher rate of clustering than low verbals in the clustering recall condition. Low verbals displayed a tendency to cluster at a higher rate than high verbals during the first stage of recall in the free recall condition. These results suggest that verbal ability is related to the strategy viduals choose for organizing information stored in memory. High verbals recalled significantly more words than low verbals in the delayed free recall and clustering recall conditions. These findings are consistent with the hypothesis that verbal ability is positively related to short-term memory storage capacity. High verbals were also faster than low verbals in the time required to orally recall their initial 10 correct words, suggesting that verbal ability is related to the speed of retrieval when relatively "deep" long-term memory processes are involved.

Individual Differences in Cognition: Verbal Ability, Clustering, and Retrieval Speed

The past decade has witnessed a resurgence of interest in the study of human cognitive abilities and their relationship to our present measures of intelligence (cf. Hunt, Frost, & Lunneborg, 1973; Hunt, Lunneborg, & Lewis, 1975). By introducing the notion of individual differences into the currently popular information-processing model of cognition, experimental psychologists have sought to identify those cognitive parameters which are most related to scores on measures commonly believed to assess intelligence. The ultimate aim of this approach has been to provide a theoretical basis, derived from modern cognitive psychology, for the design of measures of intelligence which are diagnostic rather than merely descriptive.

A central theme underlying the present study is that our current general psychometric measures of intelligence are related to certain specific information-processing skills. However, intelligence is too global a term for meaningful discussion in the current context, since it is generally recognized that psychometrically defined intelligence consists of a number of separate factors or abilities. The present study focused, therefore, on the relationship between memory processes and psychometrically defined <u>verbal ability</u>. In addition to being a robust dimension of individual variation, verbal ability is among the most commonly included ability factors in our present psychometric measures of

intelligence. Indeed, there is substantial evidence that psychometrically defined verbal ability is positively related to the speed of retrieval from memory on some tasks (Goldberg, Schwartz, & Stewart, 1977; Hunt et al., 1973; 1975). Schwartz and Wiedel (1978) have also suggested that verbal ability may be related to differences in the way in which individuals organize information stored in memory. The purpose of the present study was to pursue these relationships further.

Hunt et al. (1973) replicated Puff's (1966) clustering research using psychometrically defined high- and low-verbal ability groups. Each subject was asked to free recall lists of 30 words immediately following their presentation under both blocked and pseudorandom conditions. A written mode of free recall was employed. Free recall was scored for total number correct and number of category repetitions relative to the maximum number of possible repetitions. No differences were found in the total number of words recalled, and clustering was high for all subjects in the blocked list presentation condition. However, in the pseudorandom presentation condition, the results were counterintuitive. While both verbal ability groups showed a decrease in clustering when the words were presented in a pseudorandom order, this decrease was significantly greater for high- than for low-verbal ability subjects. Virtually identical results--also using a written mode of free recall--have been reported by Schwartz and Wiedel (1978) who found, however, that the difference in clustering rate between the high and low verbals is confined largely to the first third of the subjects' free recall output (both verbal ability groups display similar rates of semantic clustering in their subsequent recall).

There are two possible explanations which could account for the findings reported by Hunt et al. (1973) and by Schwartz and Wiedel (1978). One possibility is that individuals with high-verbal skill are unable to recall by clustering as well as individuals with low-verbal skill. Although high and low verbals do not significantly differ in their clustering rates when list presentation is blocked, it should be noted that verbatim recall in such cases will automatically yield a high rate of clustering.

However, the finding reported by Schwartz and Wiedel (1978) that high and low verbals display similar rates of clustering beyond the first third of the subjects' free recall output suggests that the relationship between verbal ability and semantic category clustering is a reflection of differences in strategy rather than capacity to recall by clustering. It seems quite likely that individuals with high-verbal ability choose to rely to a greater extent initially on a pre-categorical memory store (i.e., short-term memory) because doing so results in greater processing efficiency. The present study was thus designed to provide a direct test of the hypothesis that high-verbal individuals can recall by clustering as well as or better than low-verbal individuals.

Subjects performed a free recall task similar to that employed by Hunt et al. (1973) and Schwartz and Wiedel (1978). Subjects also performed a clustering recall task in which they were instructed to recall by grouping the words according to categories. If verbal ability is indeed related to differences in output strategy, then high verbals should display lower clustering rates than low verbals under free recall, but higher clustering rates than low verbals under clustering recall

instructions. In addition, to further explore the role of short-term memory (STM) in the relationship between verbal ability and semantic category clustering, subjects performed a delayed free recall task which was designed to interfere with STM processes. Unlike Hunt et al. (1973) and Schwartz and Wiedel (1978), however, an oral mode of free recall was employed in the present study. An oral--rather than a written--mode of recall was utilized in order to facilitate a test of the hypothesis that high verbals are significantly faster than low verbals in terms of speed of retrieval, particularly when relatively "deep" long-term memory (LTM) processes are involved.

Method

Subjects

The subjects were 36 high- and 36 low-verbal ability individuals (including both males and females) who all had English as their native language. These subjects were selected based upon their score on the verbal battery of the Lorge-Thorndike Intelligence Test (College Edition, Form 2, Houghton Mifflin), which had been administered previously to 350 undergraduates enrolled in psychology courses at Northern Illinois University. The mean verbal IQ of the high-verbal group was 122.8; the mean verbal IQ of the low-verbal group was 92.4.

Procedure

The stimulus material consisted of 2 lists of 30 words. The 2 lists were constructed so that each contained 10 words from each of the 3 taxonomic categories indicated:

List 1: colors, four-footed animals, parts of the human body

List 2: fruit, sports, articles of clothing

The words were chosen from among the category members compiled by Battig and Montague (1969). Each list was presented to the high- and low-verbal ability subjects in a pseudorandom order in which words from the various categories were arranged so that two words from the same category never followed one another. Each list was presented to the subjects 2 times under each of 3 instructional recall conditions, for a total of 12 list presentations. The order of presentation of the words within each list was different so that any given word's probability of being recalled was not appreciably influenced by its position within the list. However, the order of presentation of the words within each list remained the same for both presentations of the list to any given subject in each of the three recall conditions. The words were presented individually via slides shown for 2.6 sec with a Selectroslide SLD-1200 projector (Spindler & Sauppe); a 1.5 sec interitem interval was employed (although for 0.5 sec of this interval each slide was only partially obscured).

Subjects were run individually. In the free recall condition, the subjects were asked to verbalize aloud as many words as they could recall in any order that they chose. In the clustering recall condition, the subjects were asked to verbalize aloud as many words as they could recall by clustering the words according to semantic categories. The subjects were told that they could not "insert" a newly remembered word belonging to a previous category into that cluster once they had begun a new cluster of words belonging to a different category. The subjects were not given the category names for the words comprising either list.

In the delayed free recall condition, the subjects were asked to verbalize aloud as many words as they could recall in any order that they chose, but they were required to perform a difficult arithmetic task for 40 sec before doing so. This procedure is a variation of a task originally employed by Peterson and Peterson (1959), which has been shown to effectively prevent subjects from maintaining information in STM by blocking rehearsal (Atkinson & Shiffrin, 1971). All of the subjects were required to engage in backward subtraction aloud by 3 from 1000 after List 1 was presented, and backward subtraction aloud by 6 from 1000 after List 2 was presented. Thus, the subjects were effectively prevented from utilizing STM as a means of storing presented list items.

Subjects were required to engage in recall immediately following list presentation in the free recall and clustering recall conditions. In the delayed free recall condition, the subjects engaged in the recall of list items immediately after they had performed the arithmetic task, which immediately followed list presentation. In all three conditions, the subjects were informed prior to list presentation as to how they would be asked to recall (i.e., by clustering or by recalling the words in any order that they chose). In addition, prior to list presentation in the delayed free recall condition, the subjects were informed that they would be asked to perform an arithmetic task involving subtraction for 40 sec before beginning their recall of list items. Instructions were given separately for each instructional recall condition. That is, immediately after the subjects completed their recall for a given instructional recall condition, they were

furnished with written instructions for the next recall condition. The experimenter also explained the instructions verbally prior to each recall condition. In every instance, word list presentation began as soon as the subjects indicated their readiness. All of the subjects were allowed two minutes for the recall of list items, according to the instructions appropriate to each condition.

The sequence of instructional recall conditions was balanced across subjects with respect to order. The sequence of list presentations (List 1 and List 2) was also balanced. There were four females and two males from each verbal ability group assigned to each of the six orders of instructional recall condition presentation. In addition, an effort was made to keep the mean verbal IQ scores for each of the six instructional recall condition presentation orders as close to each other as possible within both of the verbal ability groups.

The subjects' entire recall in each of the three experimental conditions was recorded on audio tape cassettes with a Sears Model No. 79921676700 cassette recorder. After completing the experiment, the subjects were asked to give the categories they used in the clustering recall condition.

Results

Scoring

The subjects' entire recall was first scored for correct responses. Categorical intrusions (i.e., words that were category members but which were not presented), irrelevant intrusions (i.e., words that were not category members and which were not presented), and clang associations

were scored as errors. However, since errors were rare for both verbal ability groups, errors were not further analyzed. In a few instances, words were uttered with the article "a" or with "ing" added, or with the plural form omitted or added; all such utterances were scored as correct responses. Irrelevant verbalizations (e.g., repeating a word uttered previously; saying aloud such things as "Now let's see") were ignored in scoring the subjects' recall.

Recall for clustering was scored according to Bousfield's (1953) ratio of repetition (RR) formula, which is asserted to be independent of the number of words recalled (Frender & Doubilet, 1974). The RR score [RR = r/(n - 1), where r is the number of category repetitions and n the number of correct words recalled] was calculated four times for each list, once for the total recall and once for each of three recall stages. In order to facilitate a comparison with the results obtained by Schwartz and Wiedel (1978), the recall stages corresponded to each successive third of a subjects' recall output.

The four clustering (RR) measures, the total number of words correctly recalled, and three speed of retrieval measures (i.e., time required to recall two, five, and ten correct words, respectively) were initially analyzed in eight separate 2 (Verbal Ability) x 2 (List) x 2 (Practice) x 6 (Order) x 3 (Recall Condition) multivariate analyses of variance. In each analysis, the two levels of practice involved a comparison of the subjects' performance following the first presentation of each list with their performance following the second presentation of each list. The analyses for order involved between-subjects comparisons

of performance among the six different orders of recall condition presentation. Main effects and interactions involving factors other than verbal ability were not of interest in the present study and will not be discussed. Similarly, since order was included as a control variable in the analysis only for the purpose of removing its effect from the error term, interactions involving verbal ability that occur together with order will also not be presented. Tables 1, 2, and 3 summarize the results of the experiment.

Insert Tables 1, 2, and 3 about here

Number of Words Correctly Recalled

The 2 x 2 x 2 x 6 x 3 multivariate analysis of variance revealed a significant main effect for verbal ability, F (1, 60) = 6.14, $p < .02$. The mean number of words recalled by the high-verbal group was 26.25, while the corresponding mean for the low-verbal group was 25.10. However, there was also a significant Verbal Ability x Recall Condition interaction, F (2, 59) = 3.87, $p < .03$. Exclusive of interactions involving order, verbal ability did not interact with any other factor at the .05 level of significance.

In order to interpret the significant Verbal Ability x Recall Condition interaction, separate 2 (Verbal Ability) x 6 (Order) analyses of variance were computed for the data obtained in each of the three recall conditions. High and low verbals did not significantly differ in the number of words they recalled in the free recall condition,

F (1, 60) = 1.33. However, high verbals recalled significantly more words than low verbals in the delayed free recall condition, F (1, 60) = 11.25, $p < .002$, and in the clustering recall condition, F (1, 60) = 5.56, $p < .03$.

Clustering

As noted previously, separate 2 x 2 x 2 x 6 x 3 multivariate analyses of variance were computed for the total recall clustering data as well as for the clustering data obtained in each of the three recall stages. The main effect for verbal ability was not significant in the first stage, F (1, 60) = 0.95, second stage, F (1, 60) = 0.26, third stage, F (1, 60) = 0.00, or in the total recall measure, F (1, 60) = 0.81. A significant Verbal Ability x Recall Condition interaction was obtained in the first stage of recall, F (2, 59) = 3.63, $p < .04$, but not in the second stage, F (2, 59) = 2.25, third stage, F (2, 59) = 0.21, or in the total recall, F (2, 59) = 1.86. A significant Verbal Ability x Practice interaction was obtained in the third stage of recall, F (1, 60) = 4.93, $p < .04$, but not in the first stage, F (1, 60) = 1.26, or the second stage, F (1, 60) = 1.09. For the total recall, the Verbal Ability x Practice interaction approached--but did not quite attain--statistical significance, F (1, 60) = 3.75, $.05 < p < .06$. A significant Verbal Ability x List interaction occurred in the second stage of recall, F (1, 60) = 5.10, $p < .03$, and in the total recall, F (1, 60) = 4.62, $p < .04$, but not in the first stage, F (1, 60) = 1.64, or in the third stage of recall, F (1, 60) = 2.11. Exclusive of interactions involving order, verbal ability did not interact with any other factor at the .05

level of significance.

In order to interpret the significant Verbal Ability x Recall Condition interaction in the first stage of recall, separate 2 (Verbal Ability) x 6 (Order) analyses of variance were computed for the data obtained in each of the three recall conditions. High verbals displayed a significantly higher rate of clustering than low verbals in the clustering recall condition, F (1, 60) = 5.67, $p < .03$. Low verbals, however, displayed a higher rate of clustering than high verbals in the free recall condition, although the difference obtained just missed statistical significance, F (1, 60) = 3.68, $.05 < p \leq .06$. High and low verbals did not differ in the delayed free recall condition, F (1, 60) = 0.17. As may also be seen from Table 2, the absolute magnitude of the differences between the verbal ability groups obtained in the first stage of recall was quite small.

The significant Verbal Ability x Practice interaction obtained in the third stage of recall was examined further by means of t tests. High and low verbals did not significantly differ in their clustering scores without practice, t (70) = 0.79; the two verbal ability groups also did not differ significantly in their clustering scores with practice, t (70) = 0.96.

The significant Verbal Ability x List interactions obtained in the second stage of recall and in the total recall were similarly examined. In the second stage of recall, high and low verbals did not significantly differ in their clustering scores on either List 1, t (70) = 0.93, or List 2, t (70) = 1.41. In the total recall, high and low verbals also

did not differ significantly in their clustering scores on either List 1, t (70) = 0.49, or List 2, t (70) = 1.58.

The post-experimental interview indicated that, in their clustering condition recall, all subjects utilized the semantic categories from which the word lists were experimentally comprised (i.e., idiosyncratic categories were not reported to be utilized by any subject).

Speed of Retrieval

As noted earlier, the three speed-of-retrieval measures were analyzed in separate 2 x 2 x 2 x 6 x 3 multivariate analyses of variance. A significant main effect for verbal ability indicated that high verbals were faster in recalling 10 correct words, F (1, 60) = 4.89, $p < .04$. However, the verbal ability main effect was not significant on the two word time measure, F (1, 60) = 0.73, or the five word time measure, F (1, 60) = 1.06. A significant Verbal Ability x Practice interaction was obtained on the five word recall time measure, F (1, 60) = 8.25, $p < .006$, but not on the ten word recall time measure, F (1, 60) = 0.00. The Verbal Ability x Practice interaction on the two word recall time measure approached--but did not quite attain--statistical significance, F (1, 60) = 3.66, $.06 < p < .07$. The Verbal Ability x Recall Condition interaction was not significant on the two word recall time measure, F (2, 59) = 0.82, the five word recall time measure, F (2, 59) = 2.03, or the ten word recall time measure, F (2, 59) = 1.90. Exclusive of interactions involving order, verbal ability did not interact at the .05 level of significance with any other factor.

The significant Verbal Ability x Practice interaction obtained on the five word recall time measure was examined further by means of

t tests. High verbals displayed a tendency to be slightly faster than low verbals on this measure without practice, although the difference only approached statistical significance, t (70) = 1.77, $.08 < p < .09$; the two verbal ability groups did not differ on this measure with practice, t (70) = 0.08.

In order to interpret further the response time findings, a count was made of the number of times each verbal ability group utilized only a single semantic category in recalling their initial 10 words. Combining the data from all three recall conditions, high verbals utilized items belonging to only a single category in recalling 10 words in 31.9% of their recall trials; the corresponding figure for the low verbals was 17.1%. A *t* test performed on the individual subject data revealed that this difference was statistically significant, t (70) = 3.99, $p < .001$.

A count was also made of the number of times each verbal ability group utilized two semantic categories in recalling ten words while utilizing only one semantic category in recalling their initial five words. This was the most common pattern of initial 10 word recall for both verbal ability groups. Combining the data from all three recall conditions, low verbals utilized two categories in recalling ten words while utilizing only one category in recalling their initial five words in 69.7% of their recall trials; the corresponding figure for the high verbals was 53.9%.

Discussion

The results of the present study are consistent with the hypothesis that verbal ability is related to the strategy individuals choose for

organizing information stored in memory. Although the difference did not quite attain statistical significance, the high verbals clustered less than the low verbals during the first stage of recall in the free recall condition. However, the fact that the high verbals displayed a significantly higher clustering rate than the low verbals during the first stage of recall in the clustering recall condition suggests that the difference obtained under free recall is a reflection of the output strategy preferred by the high verbals. Thus, the hypothesis that high verbals can cluster as well as or better than low verbals was clearly supported.

Although the absolute magnitude of the difference in clustering rates between the verbal ability groups in the free recall condition was much smaller in the present study than the difference reported by Schwartz and Wiedel (1978), the results obtained in both studies are generally consistent. In both studies, differences in clustering rates between the high and low verbals under free recall were confined essentially to the first stage of recall. That the absolute magnitude of the difference was much smaller in the present study than the difference obtained by Schwartz and Wiedel (1978) may be a reflection of methodological differences in the two studies. That is, while free recall output was written in the Schwartz and Wiedel (1978) research, free recall output was oral in the present study. It is quite possible that the transformation of recall output into written form results in less interference with STM processes. When recall is written, subjects are clearly aware of those words they have previously recalled. However, when recall is oral, subjects are much less likely to be aware of previously recalled words, and such words tend

to be repeated later either overtly or covertly. While previously recalled words were not repeated by the subjects involved in the Schwartz and Wiedel (1978) research (Schwartz, Note 1), previously recalled words were often repeated aloud by subjects in the current study.

Taken together, the research reported by Schwartz and Wiedel (1978) and the results of the present study suggest that individuals with high-verbal ability tend to rely less upon relatively deep LTM processes than individuals with low-verbal ability. That is, when a list of words is presented in a pseudorandom order, low verbals tend to cluster semantically related items together more than high verbals during the first stage of free recall. Beyond the first stage of free recall, both high and low verbals tend to utilize clustering as an organizational aid to the same extent.

The results reported by Schwartz and Wiedel (1978) suggest that high verbals tend to recall items in verbatim order during the first stage of free recall, and they hypothesize that this tendency may reflect a differential sensitivity to order information. Unfortunately, since the oral mode of free recall employed in the current study may have interfered to some extent with the retention of order information, an unambiguous test of this hypothesis was not possible (i.e., the clustering rate for the high verbals during the first stage of recall in the free recall condition was quite high). However, the fact that a marginally significant difference in clustering rates was obtained in the current study does suggest that an output strategy emphasizing greater reliance upon STM processes may be preferred by individuals with high-verbal ability. This strategy preference may also be far more pronounced

on tasks which produce no STM interference. By utilizing "shallower" memory processes to a greater extent, high verbals may gain a relative increment in processing efficiency in comparison to low verbals.

That the high and low verbals did not differ in their clustering rates during the first stage of recall in the delayed free recall condition may also be interpreted within the context of a STM interference model. As noted previously, the delayed free recall task was designed to prevent subjects from maintaining information in STM by blocking rehearsal. At the same time, however, it should be noted that clustering rates in the delayed free recall condition were lower than in the clustering recall condition. Thus, although the high verbals displayed a significantly higher rate of clustering than the low verbals during the first stage of recall in the clustering recall condition, the instructions employed in the delayed free recall condition (i.e., "recall the words in any order that you wish") may have precluded a similar result.

Although high and low verbals did not differ in the time to recall two or five words, high verbals were significantly faster in the time required to recall their initial ten correct words. There are two factors which can account for these findings. First, in order to recall ten words, subjects required access to two semantic categories in a majority of their recall trials, while access to only one semantic category was typically required to recall two or five words. Clearly, access to two semantic categories requires greater depth of processing than access to only one semantic category. Thus, the hypothesis that verbal ability is related to the speed of retrieval when relatively deep LTM processes are involved was also supported. In addition, the high verbals utilized items belonging

to only a single category in recalling their initial 10 words significantly more often than the low verbals. Since access to only one semantic category requires less depth of processing than access to two categories, this capability contributed to the high verbals' advantage in terms of speed of retrieval.

High and low verbals did not differ in the number of words they recalled in the free recall condition. This finding is similar to the results reported by Hunt et al. (1973) and Schwartz and Wiedel (1978). However, in the present study, high verbals recalled significantly more words than low verbals in the delayed free recall and clustering recall conditions. While the magnitude of the difference was relatively small in the latter two conditions, these results are consistent with the hypothesis that individuals with high-verbal ability may be better able to maintain partially reconstructed sequences of items in an output buffer store until reconstruction is complete and the items can be emitted in a reordered sequence. In the present study, semantic category clustering clearly involved a reordering of input material. It is quite likely that individuals with high-verbal ability possess greater STM storage capacity (Matarazzo, 1972; Jensen, 1970), and that this facilitates their capability to maintain slightly larger sequences of reordered items in an output buffer.

The experimental factors, list and practice, did not differentially affect the performance of the high and low verbals on any of the dependent measures. The three-way and four-way interactions involving verbal ability, recall condition, list, and practice (excluding order) were not statistically significant on any measure. Although the Verbal Ability x List

interaction was significant on two measures (stage two clustering and total recall clustering), follow-up analyses did not reveal significant differences in the performance of the high vs. low verbals on either List 1 or List 2. Similarly, although the Verbal Ability x Practice interaction was significant on two measures, (stage three clustering and time required to recall five words), follow-up analyses revealed no significant differences between the verbal ability groups with either level of practice.

Although the absolute magnitude of the differences generally obtained in the present study appears to be small, the significance of the findings in terms of furthering our understanding of verbal ability should not be taken lightly. For example, the high verbals recalled an average of only 1.15 more words than the low verbals following presentation of a list of 30 words. However, when one considers that each of the 5 verbal battery subtests of the Lorge-Thorndike Intelligence Test contains at least 150 words to be read and processed (one contains more than 300 words and another more than 500 words), the implications in terms of relative processing capacity differences between the two ability groups become considerable. Similarly, the high verbals were only 2.6 sec faster than the low verbals in recalling their initial 10 correct words. However, when one considers the number of words that must be processed in each subtest of the Lorge-Thorndike Intelligence Test and the fact that each subtest is timed, the relative advantage afforded the high verbals by virtue of their superior retrieval speed is also considerable. Thus, the results of the present study further our under-

standing of verbal ability (and, hence, intelligence) in two ways. First, verbal ability is positively related to both processing capacity and the speed of retrieval. Second, the findings obtained in the present study suggest that verbal ability is also related to processing strategy.

If verbal ability is indeed related to the strategy for organizing and processing information stored in memory on some tasks, it is quite possible that individuals with low-verbal ability could be trained to make more propitious use of the strategy employed by individuals with high-verbal ability. As Schwartz and Wiedel (1978) have suggested, perhaps part of the reason high verbals do well on timed psychometric tests is that they do not process material to relatively deep semantic levels when such processing is unnecessary. Low verbals, however, may process information to deeper semantic levels when shallower processing would be sufficient. It is possible that low verbals possess less STM storage capacity and, therefore, must rely to a greater extent upon LTM processes on some tasks, but it is also conceivable that they are less aware of the relative increment in information-processing efficiency that would result from greater reliance upon STM processes. Clearly, this is a fruitful area for further research, since the capability to remediate deficiencies in what is commonly thought of as intelligence will ultimately hinge upon an understanding of the cognitive components of performance in tasks that have been used to assess mental abilities, as well as an understanding of contributing sources of individual differences.

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1. Schwartz, S. Personal communication, June, 1980.

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Footnotes

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Table 1

Mean Number Of Words Recalled By The Two Verbal Ability Groups
Under Three Instructional Recall Conditions

	Group				
	High Verbal		Low Verbal		
Recall Condition	Mean (1)	SD	Mean (2)	SD	(1) - (2)
Free Recall	26.08	3.39	25.44	3.10	0.64
Delayed Free Recall	26.40	3.23	24.67	3.00	1.73
Clustering Recall	26.26	2.44	25.20	2.94	1.06

Table 2

Mean Clustering Scores For The Two Verbal Ability Groups
Under Three Instructional Recall Conditions

	Clustering Scores							
	First Stage		Second Stage		Third Stage		Total Recall	
Group	Mean	SD	Mean	SD	Mean	SD	Mean	SD
High Verbal								
Free Recall	.823	.196	.809	.178	.766	.182	.783	.162
Delayed Free Recall	.875	.135	.862	.153	.802	.203	.824	.138
Clustering Recall	.974	.033	.920	.054	.976	.030	.916	.016
Low Verbal								
Free Recall	.888	.113	.854	.118	.777	.171	.826	.106
Delayed Free Recall	.885	.098	.855	.082	.797	.133	.833	.085
Clustering Recall	.953	.042	.913	.056	.967	.025	.907	.020

Table 3

Mean Time In Seconds For The Two Verbal Ability Groups To Recall Variable Number Of Correct Words

	Time To Recall					
	2 Words		5 Words		10 Words	
Group	Mean	SD	Mean	SD	Mean	SD
High Verbal	2.9	0.6	6.6	1.5	17.6	4.9
Low Verbal	3.0	0.8	7.0	1.7	20.2	5.5